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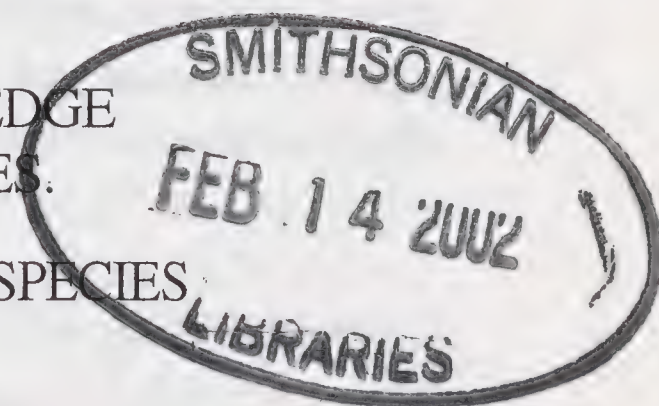
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CONTRIBUTIONS TO THE KNOWLEDGE OF SICILIAN FRESHWATER FISHES.

II. NOTES ON SOME ALLOCHTHONOUS SPECIES RECENTLY INTRODUCED *



FOREWORD - The introduction of exotic fishes in inland waters, as well as man-made transformations of biotopes produce serious problems concerning the conservation of local fish communities (ELTON, 1958; LELEK, 1980; WELCOMME, 1984; BIANCO, 1995 a, b; ZERUNIAN & TADDEI, 1996; KOTTELAT, 1997). The island of Sicily is characterized by the lack of endemic and primary indigenous freshwater fishes and does not correspond to a particular ichthyogeographic district (BIANCO, 1982; GANDOLFI *et al.*, 1991).

The knowledge on the distribution of fishes in the inland waters of Southern and insular Italy is still far from being satisfactory (GANDOLFI & ZERUNIAN, 1987). Freshwater ichthyofauna of Sicily has been the subject of some recent contributions mainly aiming at the knowledge of local situations (TIGANO, 1982; DUCHI, 1988; ZAVA & VIOLANI, 1991; FERRITO & TIGANO, 1995; DUCHI, 1996; ZAVA *et al.*, 1996; ZAVA *et al.*, 1997; CATALANO *et al.*, 1997). Sicily is particularly poor in fish species when compared with the regions of Southern and, even more so, of Northern Italy; the few autochthonous taxa include: *Petromyzon marinus* L., 1758, *Anguilla anguilla* (L., 1758), *Alosa fallax* (Lacépède, 1803), *Salmo trutta macrostigma* (Dum., 1858) [= *S. cettii* Rafinesque Schmaltz, 1810], *Aphanius fasciatus* Nardo, 1827, *Atherina boyeri* Risso, 1810, *Syngnathus abaster* Risso, 1810, *Dicentrarchus labrax* (L., 1758), *Mugil cephalus* L., 1758, *Liza ramada* (Risso, 1826), *Liza aurata* (Risso, 1810), *Chelon*

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labrosus (Risso, 1826) and *Salaria fluviatilis* (Asso, 1801).

In the present contribution the authors report about the spreading of four allochthonous species which have been recently introduced in the Island: *Rutilus rubilio* (Bonaparte, 1837) (family Cyprinidae); *Ictalurus melas* (Rafinesque, 1820) (family Ictaluridae); *Esox lucius* L., 1758 (family Esocidae); *Micropterus salmoides* (Lacép., 1802) (family Centrarchidae). Besides Sicily, these four taxa are also widespread in continental Italy. *Rutilus rubilio* is indigenous to the central and southern regions of the Italian peninsula, while *Esox lucius*, another native fish, can be found in Northern and Central Italy, as well as in Sardinia where it has become established. The remaining two species were introduced from North America since the turn of last century and are now common in continental Italy, *Ictalurus melas* being present also in Sardinia (GANDOLFI *et al.*, 1991; AMORI *et al.*, 1993).

MATERIAL AND METHODS - During the years 1992-1997 the authors have conducted some researches in order to improve the knowledge on the ichthyological communities which typify watercourses and reservoirs in Sicily. Captures were made by means of trammel, trawl nets and electrofishing devices mainly during the spring and summer months. On the whole, the following waterbodies were investigated: 18 large reservoirs out of a total of 31 ones existing in Sicily (CALVO *et al.*, 1993), 3 smaller ones (Campofranco near Agrigento and the little Saladino "lakes" near Palermo) and some stations on the course of the Simeto, Belice, northern Imera, Alcantara, Anapo and Irminio rivers. Additional information was obtained by local sport anglers, who have always been willing to show their catch for examination.

RESULTS AND CONSIDERATIONS - The presence of *Rutilus rubilio*, *Esox lucius*, *Ictalurus melas* and *Micropterus salmoides* was recorded in twenty reservoirs and in some watercourses of the island (see table I and Fig. 1). As a matter of fact, these four species, recently introduced, have naturalised successfully and they represent now an integral part of many freshwater communities. While *E. lucius*, *I. melas* and *M. salmoides* were apparently captured more frequently in man-made reservoirs, *R. rubilio* was collected also in some watercourses, showing a wide capability of adaptation to frequently unfavourable environmental conditions. Its presence in the lower section of Belice river and in some hypertrophic or eutrophic reservoirs (Arancio, Ogliastro, Villarosa and Rosamarina "lakes") is an index of its good tolerance to the dystrophic conditions which characterize these aquatic ecosystems in Sicily. This cyprinid, already greatly widespread in the basin of Simeto river (FERRITO & TIGANO, 1995), represents the dominating species of the fish community in some reservoirs (RUSSO *et al.*, in press). A few years after the first record for Sicily in the

Simeto by TIGANO & FERRITO (1987), *R. rubilio* was also collected by the present authors in the Alcantara river (Mojo Alcantara stretch) and in the Irminio river (inlet stretch in Santa Rosalia reservoir).

The introduction of these four species is doubtless due to the activity of some sport fishing associations, or, less likely, to individual anglers who, taking advantage of an extremely defective regional and national legislation, have spread fish fry in the reservoirs in order to assure the interest of the economical sector now rapidly on the rise in Sicily.

The considerable spreading so far recorded of the allochthonous species studied by the authors (in particular of *R. rubilio* and *M. salmoides*) poses several important problems concerning the conservation of the indigenous ichthyofauna. The predatory behaviour of *Esox lucius*, *Ictalurus melas* and *Micropterus salmoides* and the wide ecological valence of *R. rubilio* exert doubtless a relevant influence on the balance of fish communities. Some observations by the present authors concerning the stomach contents of 21 specimens of *M. salmoides* collected in the Rosamarina reservoir have revealed two cases of predation on the Blennid fish *Salaria fluviatilis*.

Previous investigations conducted in the mid Seventies on the ichthyological composition of the inland waters of the island (FARANDA, 1977) have shown quite a different situation if compared with the data recently collected by the authors: the four allochthonous species mentioned above were still absent.

Furthermore, the authors have found that transportation of fishes by the anglers, in particular of *M. salmoides*, from a hydrographic basin to another, has allowed the spreading of the freshwater mussel *Unio elongatulus* C. Pfeiffer, 1825 in some hill waterbodies where this mollusc was not present previously.

Table I - List of Sicilian waterbodies where allochthonous fish species have been recently recorded by the authors and years of recording.

Site	Province	<i>R. rubilio</i>	<i>E. lucius</i>	<i>I. melas</i>	<i>M. salmoides</i>
Poma reservoir	Palermo				1995-97
Piana degli Albanesi reservoir	Palermo				1995-97
Scanzano reservoir	Palermo				1993-97
Rosamarina reservoir	Palermo	1995-97			1993-97
Garcia reservoir	Palermo	1994-97		1995-97	1996-97
Saladino hill "lakes"	Palermo				1996-97
Belice River 1, Poggioreale	Trapani	1996			
Rubino reservoir	Trapani				1996-97
Belice River 2, Mulino Ferriato	Trapani	1994			
Arancio reservoir	Agrigento	1993-97		1996	
Castello reservoir	Agrigento		1996	1996	
San Giovanni reservoir	Agrigento				1996
Campofranco reservoir	Agrigento				1995
Disueri reservoir	Caltanissetta				1995
Ancipa reservoir	Enna	1994			
Pozzillo reservoir	Enna	1994			1994
Nicoletti reservoir	Enna		1994	1996	
Cerami reservoir	Enna	1992 -1997			
Dittaino reservoir	Enna	1994			
Salso reservoir	Enna	1994			
Ogliastro reservoir	Enna	1994	1992		1996
Villarosa reservoir	Enna	1994			
Olivo reservoir	Enna		1996		1996
Dirillo reservoir	Catania		1995-97		1994-97
Santa Rosalia reservoir	Ragusa	1990			1990-97
Irminio River	Ragusa	1990			1990
Alcantara River (Mojo)	Messina	1990			

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Fig. 1 - Map of Sicily with collecting sites of the four allochthonous species considered in the paper (ME = Messina; CT = Catania; SR = Siracusa; RG = Ragusa; EN = Enna; CL = Caltanissetta; AG = Agrigento; PA = Palermo; TP = Trapani).

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RIASSUNTO

Dal 1992 al 1997 gli autori hanno condotto un'indagine sulle comunità ittiche presenti nei numerosi invasi siciliani.

I campionamenti sono stati effettuati mediante l'uso di un tramaglio, una sciabica e di un elettrostorditore; ulteriori informazioni sono state raccolte grazie ad alcuni pescatori che hanno permesso di esaminare il loro pescato. In questa nota vengono presentati alcuni dati sulla presenza di quattro specie alloctone recentemente introdotte in Sicilia: *Rutilus rubilio*, *Ictalurus melas*, *Esox lucius* e *Micropterus salmoides*. In alcuni casi le popolazioni si sono acclimatate con successo.

ABSTRACT

During the years 1992-97 the authors have conducted some investigations in order to improve the scanty knowledge on the fish communities which typify watercourses and reservoirs of inland Sicily. Sampling was done by means of a trammel, trawl nets and electrofishing devices; additional information was gathered from some sport anglers who have procured the specimens. In the present note the authors give the first data concerning the spreading of four new allochthonous species recently introduced in Sicily: *Rutilus rubilio*, *Ictalurus melas*, *Esox lucius* and *Micropterus salmoides*. In some cases the relevant populations have naturalized successfully.